

## (12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



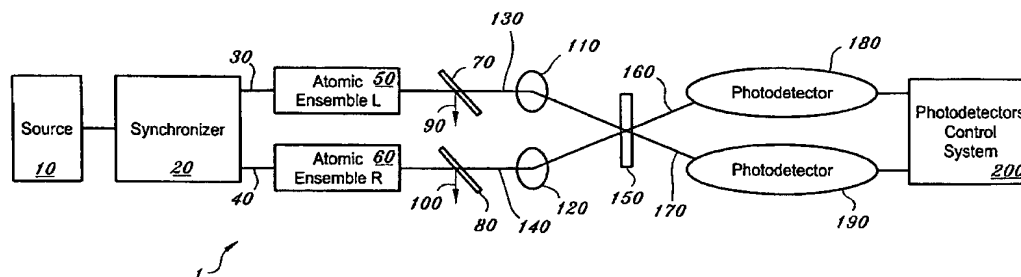
(43) International Publication Date  
4 December 2003 (04.12.2003)

PCT

(10) International Publication Number  
**WO 03/101013 A1**

- (51) International Patent Classification<sup>7</sup>: **H04B 10/00**
- (21) International Application Number: PCT/US02/15135
- (22) International Filing Date: 20 May 2002 (20.05.2002)
- (25) Filing Language: English
- (26) Publication Language: English
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- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Declaration under Rule 4.17:**  
— of inventorship (Rule 4.17(iv)) for US only
- Published:**  
— with international search report
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: LONG-DISTANCE QUANTUM COMMUNICATION



(57) **Abstract:** The invention provides systems and methods enabling high fidelity quantum communication over long communication channels even in the presence of significant loss in the channels comprising laser manipulation of quantum correlated atomic ensembles using linear optic components (110, 120), optical sources of low intensity pulses (10), beam splitters (150), single-photon detectors (180, 190) requiring only moderate efficiencies. The invention provides fault-tolerant entanglement generation, connection, using a sequence of steps that each provide built-in entanglement purification and are each resilient to the realistic noise. The invention relies upon collective rather single particle excitations in atomic ensembles and result in communication efficiency scaling polynomially with the total length of a communication channel.